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EXAMINER

MCCLOUD, RENATA D

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Application Number: 10/694,884
Filing Date: October 29, 2003
Appellant(s): KANDA, KOJI

MAILED

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GROUP 2800

Koji Kanda
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 09/11/2006 appealing from the Office action mailed 01/19/2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,097,286	Discenzo	8-2000
6,161,068	Kurishige et al	12-2000

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Discenzo (US 6097286) in view of Kurishige et al (US 6161068).

Claims 1 and 11: Discenzo teaches a steering apparatus (Fig. 1) which uses a steering motor (Fig. 1:28) to supply a steering mechanism (Fig. 1:20) with force corresponding to a steering amount applied to a steering member/means (Fig. 1:22), comprising: a reaction force motor (Fig. 1:38; col. 3:24-25); a torque sensor (Fig. 1:36) sensing the steering motor torque (torque of motor 28); a means for filtering a component within a frequency range out of the sensed torque (fig. 1:road feel computer, 39; Col. 3:11-15 teaches filtering the torque, which has a frequency as described in col. 2:54-65; Col. 2: 54-65, also discloses shifting or attenuating the impulse frequency); and means (fig 1:road feel computer; fig 2) for driving the reaction force motor (38) so as to supply the steering member with a force corresponding to the extracted

component and the steering amount (Col. 2:54-3:10). Discenzo does not teach a current sensor. Kurishige et al teach a steering apparatus comprising a current sensor/sensing means (9) and that torque is proportional to current (Col. 1:44-54). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus taught by Discenzo to sense current as taught by Kurishige et al in order to provide an assist torque to the motor and reduce discomfort to the driver.

Claim 21: Discenzo teaches a steering apparatus (Fig. 1) which uses a steering motor (28) to supply a steering mechanism (30) with force corresponding to a steering amount applied to a steering member (22), comprising: a steering motor (28); a reaction force motor (Fig. 1:38); a torque sensor (Fig. 1:36) sensing the steering motor torque; a means for filtering a component within a frequency range out of the sensed torque (Col. 2: 54-65); and driving the reaction force motor (38) so as to supply the steering member with a force corresponding to the extracted component and the steering amount (Col. 2:54-3:10). Discenzo does not teach a current sensor. Kurishige et al teach a current sensor (9) and that torque is proportional to current (Col. 1:44-54). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus taught by Discenzo to sense current as taught by Kurishige et al in order to provide an assist torque to the motor and reduce discomfort to the driver.

Discenzo and Kurishige et al teach the limitations of claims 1 and 11. Referring to claims 2-10 and 12-20:

Claims 2 and 12: Discenzo teaches a controller for amplifying the extracted component (Col. 2: 54-65 the frequency maybe amplitude magnified).

Claims 3 and 13: Kurishige et al teach a filtered component being amplified by a fixed amplification factor (col. 6:8-15, 5:27-33, rotation speed is equivalent to frequency. They teach high pass filtering the speed and multiplying the filtered speed by a control gain).

Claims 4, 8, 14, and 18: Kurishige et al teach a controller (Fig. 1:20) amplifies (col. 6:8-15) the component with an amplification factor that increases and decreases based on speed (Fig. 9a-9b; col. 12:65-13:19, gain agrees with reverse characteristics of the frequency/speed at which steering oscillation occurs. Oscillation involves increasing and decreasing).

Claims 5, 6, 15, and 16: Kurishige et al teach the filtering range is between 3-15 Hz (Col. 5:44-48).

Claims 7, 17: Kurishige et al teach the range is fixed (Col. 5:44-48).

Claims 9, 19: Kurishige et al teach the controller sets a target force; adds the target value of the force to the extracted component, wherein the controller drives the motor based on the addition (Col. 6:8-24).

Claims 10, 20: Discenzo teaches the steering member (Fig. 1: 2) and mechanism (Fig. 1: 30) are not mechanically connected (Col. 1:19-25,41-44).

(10) Response to Argument

(A) In response to appellant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071,

5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, both references disclose power steering apparatuses.

Also, Kurishige et al do not disclose the type of power steering apparatus the invention is and appellant has not disclosed where in the reference Kurishige et al disclose a "traditional" power steering system. Appellant argues that traditional power steering systems have a steering wheel mechanically connected to the steering linkages. However Kurishige et al do not disclose such features. Kurishige et al is in fact silent with respect to the type of power steering system.

Appellant further argues that Discenzo is a steer-by wire system that does not require the "assist torque". The examiner disagrees. Discenzo clearly teaches that an assist torque is provided due to torque feedback from the torque sensor (col. 2:54-60; 1:35-50). Discenzo teaches that "the feedback provided by mechanical linkages does provide the driver with an appreciation of the traction that the vehicle is experiencing on a particular road surface". Discenzo further discloses that it is desirable to have a torque feedback in order to feedback road conditions/road feel to the driver (col. 1: 54-65). This feedback torque is the "assist torque". Therefore it is possible for a "steer-by-wire" system to have an "assist torque", being that the assist torque is the "road feel". Assist torque is torque that aids or supplements the steering. In both Discenzo and Kurishige et al teach a torque feedback that "aids or supplements" the steering by providing road feel.

In response to appellant's argument that the references fail to show certain features of appellant's invention, it is noted that the features upon which appellant relies (i.e., steer-by-wire) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Also, the examiner did not argue that it would have been obvious to eliminate Discenzo's torque sensor and instead monitor the current of Discenzo's motor based on the teachings of Kurishige et al. The appellant has misinterpreted the grounds of the rejection. The examiner indicated that it would have been obvious to modify the apparatus taught by Discenzo to sense the current. Appellant's claim language does not preclude the addition of sensing current or a current sensor, therefore the sensing of the current may be additional to the invention of Discenzo, especially since torque and current are proportional. Appellant's claim language recites the transitional phrase "comprising" which is open-ended, thus allowing additional features to be added.

In response to appellant's argument that the word discomfort does not appear in the Discenzo or Kurishige et al, and therefore it is unclear where the motivation is derived, Kurishige et al recites "An electric power steering control system reducing steering torque without making the drive feel uncomfortable torque oscillation" (see abstract lines 1-3). Although the word "discomfort" may not appear in the references, the recitation "reduce discomfort to the driver" is an obvious variation or paraphrasing of the recitation "without making a driver feel uncomfortable". It is obvious to one having ordinary skill in the art that "uncomfortable" and "discomfort" are synonymous.

In response to appellant's argument that it is unclear how removing Discenzo's torque sensor would reduce discomfort to a driver, as stated above, the appellant has misinterpreted the rejection. The examiner indicated that it would have been obvious to modify the apparatus taught by Discenzo to sense the current. The examiner never indicated that it would have been obvious to remove a sensor. Also, appellant's claim language does not preclude the addition of sensing current or a current sensor, therefore the sensing of the current may be additional to the invention of Discenzo, especially since torque and current are proportional. Appellant's claim

language recites the transitional phrase "comprising" which is open-ended, thus allowing additional features to be added. MPEP 2144 recites:

"Rational different from applicant's is permissible. The reason or motivation to modify the reference may often suggest what the inventor has done, but for a different purpose or to solve a different problem. It is not necessary that the prior art suggest the combination to achieve the same advantage or result discovered by applicant. In re Linter, 458 F.2d 1013, 173 USPQ 560 (CCPA 1972) (discussed below); In re Dillon, 919 F.2d 688, 16 USPQ2d 1897 (Fed. Cir. 1990), cert. denied, 500 U.S. 904 (1991) (discussed below). Although Ex parte Levengood, 28 USPQ2d 300, 1302 (Bd. Pat. App. & Inter. 1993) states that obviousness cannot be established by combining references "without also providing evidence of the motivating force which would impel one skilled in the art to do what the patent applicant has done" (emphasis added), reading the quotation in context it is clear that while there must be motivation to make the claimed invention, there is no requirement that the prior art provide the same reason as the applicant to make the claimed invention".

One having ordinary skill in the art would know that if a motor has a torque, it also has a current, and vice versa. Torque can be determined or sensed based on the current, and current can be determined or sensed based on the torque. The examiner referred to the background of Kurishige et al to show that current and torque are proportional, and that if the torque is known, the current is also known. Kurishige et al also refer to the term "torque-current". Torque is the output of a motor, therefore one cannot have torque without current. The amount of torque output from a motor is based on the current provided to the motor. When current is provided to the motor, the motor converts electrical energy to mechanical work (torque) as the output shaft of the motor turns. This is why torque and current are proportional. Torque is the mechanical

Art Unit: 2837

version of electrical current. It is well known in the art that torque and current have the linear relationship of:

$$\text{torque} = \text{constant} \times \text{current},$$

or in shorthand

$$T = K \cdot I,$$

wherein "T" is torque in Newton meters (Nm), "I" is the current in amps (A), and "K" is the torque constant in Newton meters per amp (Nm/A), wherein the torque constant is a number representing the ratio of the torque output by a motor to the current supplied to the motor. This relationship can be found in motor control books as well as on the Internet. A form of this relationship is therefore:

$$Nm = (Nm/A) \cdot A,$$

which further simplified is:

$$Nm = Nm,$$

In the case of current:

$$I = T/K \text{ or}$$

$$A = Nm / (Nm/A)$$

Which simplified is

$$A = A$$

These equations show that torque is proportional to current and vice versa. If one is known, the other is known. This is why if the torque is sensed, the current is also sensed. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Discenzo to sense current as taught by Kurishige et al since torque and current are proportional.

B. In response to appellant's argument that even if the references could be combined, the result would not be the invention recited in the pending claims, MPEP 2144 recites:

"Rational different from applicant's is permissible. The reason or motivation to modify the reference may often suggest what the inventor has done, but for a different purpose or to solve a different problem. It is not necessary that the prior art suggest the combination to achieve the same advantage or result discovered by applicant. In re Linter, 458 F.2d 1013, 173 USPQ 560 (CCPA 1972) (discussed below); In re Dillon, 919 F.2d 688, 16 USPQ2d 1897 (Fed. Cir. 1990), cert. denied, 500 U.S. 904 (1991) (discussed below). Although Ex parte Levengood, 28 USPQ2d 300, 1302 (Bd. Pat. App. & Inter. 1993) states that obviousness cannot be established by combining references "without also providing evidence of the motivating force which would impel one skilled in the art to do what the patent applicant has done" (emphasis added), reading the quotation in context it is clear that while there must be motivation to make the claimed invention, there is no requirement that the prior art provide the same reason as the applicant to make the claimed invention".

Also, appellant has freely admitted that "1) some traditional power steering systems may produce a steering motor assist current approximately proportional to torque on a steering column and 2) increasing the current input to some motors, under some conditions, will increase the torque output by those motors." However appellant has failed to show instances where this will not happen. Therefore, as admitted by appellant, it is well known in the art that 1) some traditional power steering systems may produce a steering motor assist current approximately proportional to torque on a steering column and 2) increasing the current input to some motors, under some conditions, will increase the torque output by those motors.

In response to appellant's argument that the references fail to show certain features of appellant's invention, it is noted that the features upon which appellant relies (i.e., the torque

Art Unit: 2837

applied against a steering gear box by vehicle wheels is proportional to the current produced by the steering motor used to move those wheels. Useful information can be obtained from extracted frequencies of the motor current based on forces input through a vehicle wheels, steering linkages, and servomotor) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Claim 1:

As stated above, the examiner did not argue that it would have been obvious to eliminate Discenzo's torque sensor and instead monitor the current of Discenzo's motor based on the teachings of Kurishige et al. The appellant has misinterpreted the grounds of the rejection. The examiner indicated that it would have been obvious to modify the apparatus taught by Discenzo to sense the current. Appellant's claim language does not preclude the addition of sensing current or a current sensor, therefore the sensing of the current may be additional to the invention of Discenzo, especially since torque and current are proportional. Appellant's claim language recites the transitional phrase "comprising" which is open-ended, thus allowing additional features to be added.

Claim 3:

In response to appellant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Discenzo teaches amplifying the extracted component. Kurishige et al teach amplifying an extracted frequency component with a

Art Unit: 2837

fixed factor (col. 6:8-15 teaches multiplying the filtered speed output by a gain. Col. 5:21-27 teaches that speed and frequency are the same. Therefore the extracted component is multiplied by a gain).

In response to appellant's argument that Kurishige et al do not teach amplifying an extracted frequency component of a motor current for use in controlling a reaction force motor, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

Claim 4:

In response to appellant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Discenzo teaches amplifying the extracted component. Kurishige et al teach a controller (Fig. 1:20) amplifies (col. 6:8-15) the component with an amplification factor that increases and decreases based on speed (Fig. 9a-9b; col. 12:65-13:19, gain agrees with reverse characteristics of the frequency/speed at which steering oscillation occurs. Oscillation involves increasing and decreasing).

Claim 8:

In response to appellant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re*

Art Unit: 2837

Merck & Co., 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Discenzo teaches amplifying the extracted component. Kurishige et al teach a speed sensor (10) and a controller (Fig. 1:20) amplifies (col. 6:8-15) the component with an amplification factor that increases and decreases based on speed (Fig. 9a-9b; col. 12:65-13:19, gain agrees with reverse characteristics of the frequency/speed at which steering oscillation occurs. Oscillation involves increasing and decreasing). Also Kurishige et al teach speed and frequency are the same (Col. 5:21-27).

Claim 11:

In response to appellant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The combination of Discenzo and Kurishige et al teach an obvious equivalent of the claimed means plus function limitations (see the rejection of claim 11 above). Also, in response to the remainder of appellant's arguments with respect to claim 11, these arguments have already been addressed with the arguments of claim 1.

Claims 12-20:

In response to appellant's arguments with respect to claims 12-20, these arguments have been addressed above in the arguments for claims 1 and 11.

Claim 21:

In response to appellant's arguments with respect to claim 21, these arguments have been addressed above in the arguments for claim 1.

Art Unit: 2837

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,


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